

## Bird Strike Risk for Space Launch Vehicles

Within seconds after liftoff of the Space Shuttle during mission STS-114, a turkey vulture impacted the vehicle's external tank. The contact caused no apparent damage to the shuttle, but the incident led NASA to consider the potential consequences of bird strikes during a shuttle launch. The environment at Kennedy Space Center provides unique bird strike challenges due to the Merritt Island National Wildlife Refuge and the Atlantic Flyway bird migration routes.

This presentation will outline an approach for estimating risk resulting from bird strikes to space launch vehicles. The migration routes, types of birds present, altitudes of those birds, exposed area of the launch vehicle, and its capability to withstand impacts all affect the risk due to bird strike. Lessons learned, challenges over lack of data, and significant risk contributors will be discussed.